# COUNTY OF SAN DIEGO
# DEPARTMENT OF ENVIRONMENTAL HEALTH

## GUIDELINE FOR THE INSTALLATION OF GRAYWATER SYSTEMS

**PURPOSE:**

This guideline is to supplement the California Plumbing Code (CPC), Appendix G "Graywater Systems for Single-Family Dwellings" and "Graywater Guide" published by the Department of Water resources. This additional information and direction is to assist staff in clarifying the plan check, field review and installation processes. The process is designed to allow homeowners to easily install graywater systems, while minimizing health risks. This guideline will also address system failures, and our response to complaints associated with graywater systems.

**BACKGROUND:**

The San Diego Graywater Ordinance and Standards, which went into effect in November 1991, allowed the installation of graywater systems in the unincorporated areas of the County on lots previously developed for the use of septic systems, or on any lot during a declared drought emergency.

In September 1992, Appendix "G", of the Uniform Plumbing Code (UPC), "Graywater Systems for Single Family Dwellings" was approved by the International Association of Plumbing and Mechanical Officials (IAPMO). Appendix "G" permitted the use of graywater irrigation by subsurface systems and prohibited the use of graywater by aerial spraying, surface or drip irrigation.

On March 8, 1994, the California Buildings Standards Commission approved Appendix "G", "Graywater Systems for Single-Family Dwellings" as part of the California Plumbing Code (CPC). This Appendix permits the use of graywater irrigation by subsurface drip or mini-leach line systems and prohibited surface irrigation.

On March 18, 1997, the California Building Standards Committee approved Appendix "G", "Graywater Systems". This appendix expanded the use of graywater systems to all parcels in the state and defined "Air Gap" as a "Space or Other Physical Device Which Prevents Backflow".

**AUTHORITY:**

- CPC, Title 24, Part 5, California Administrative Code, Appendix "G" , "Graywater Systems For Single Family Dwellings"-which addresses the permitting, inspection and specifications for subsurface disposal of graywater.
- San Diego County Code, Title 6, Division 8, Chapter 3, Section 68.301 et al, known as the Septic Tank Ordinance, addresses the permitting, inspection and specifications for subsurface sewage disposal systems.
- San Diego County Code Section 53.101 et al, establishes the San Diego County Plumbing Code which adopts the following sections of the UPC: Sections 301 et al, 407 through 409, and 1101 et al, and all other Appendices except Appendix I, Subsurface disposal systems.

**OBJECTIVES:**

- To ensure subsurface graywater systems will not create groundwater or public health hazards.

- To educate the general public on the proper operation and maintenance of graywater systems.

- To permit and inspect all graywater systems installed in San Diego County.

- To allow for easy installation while minimizing nuisances and health risks.

- To provide direction to staff for the review and installation of graywater systems.

**BASIC CRITERIA:**

- The septic system or public sewer is the required fail-safe backup for a graywater system and this allows flexibility with graywater installations. The installation of a graywater system does not allow for the reduction in size of the sewage disposal system.

- Percolation tests may be waived unless there is evidence of impervious soil conditions.

- If percolation testing is necessary the minimum number of test holes would be based on the number of tests needed to describe the soil conditions of the site. There will be no set minimum number of test holes.

  The installation of a graywater system in fill is allowed because of the following:
  1. Limited amount of water discharged through the graywater system each day.
  2. Graywater systems are not allowed in clay soils
  3. Graywater systems are shallow in depth.

  Even though graywater system system in fill soil, there are some risks and the homeowner should be made aware that fill soil does not have the same characteristics as natural soil. Compacted fill soil is not the same as natural soil, and it usually does not percolate well. Water movement in fill may be in any direction depending on uniformity of the soil.

**SUMMARY OF ACTIVITIES**

The "Graywater Guide" published by the Department of Water Resources, contains the "Graywater Mandatory Measures Checklist" which is to be used for plan check, site review and system installation inspection. This checklist is very thorough and should be helpful. Please see Appendix "A" for a reference copy. An Analysis of activities relating

to plan check, site review, system inspection and fee collection has been made based on the type of graywater system. Please see Appendix "B", "Graywater Systems, Plan Check, Site Check and Inspection Breakdown" for a quick reference.

**SYSTEM DEFINITIONS**

- SIMPLE COMPONENT SYSTEM - No pump is proposed.
- MULTI-COMPONENT SYSTEM - Filter backwash with potable water connection and/or a pump is proposed.
- COMPLEX SYSTEM - The review of tentative maps for approval of graywater systems, individual systems with multi-collection tanks/pumps and irrigation fields or any other projects which may require extensive review.

**PERMITTING PROCESS:**

We have met with the City Building Departments regarding the permitting process of graywater systems and an agreement has been made through the International Conference of Building Officials (ICBO), per an ICBO Policy. The process and breakdown of responsibilities are as follows:

The building departments will permit and inspect the sewer lateral connection, water line connection with backflow device, graywater plumbing and any electrical connections. The DEH will permit and inspect everything from and including the holding tank to the last point of graywater discharge, including pressure testing.

1. The process will start with DEH. The customer will be advised to contact the nearest DEH office. At that time, a determination will be made, based on city/county requirements, lot size, groundwater level, and percolation rates (if known) on the feasibilty of the graywater system on the property. Drawings, specifications and requirements of Section G-4 of the CPC will be based on what is or is not known about the lot.

2. The completed plans will be submitted with the appropriate fee to DEH.

3. After approval of the system design plans, the applicant will be referred to the water purveyor for approval of proper backflow protection until such time that the DEH has a post meter backflow program satisfactory to the water purveyors (this referral will be made only for non-gravity systems)

4. Upon proof of satisfactory backflow protection (where required), the DEH will issue an installation permit to a contractor or lawful agent of the homeowner. Upon approval of the plans by DEH, the customer will be advised to go to the local building department and request the appropriate permit. This permit will not be issued to the customer unless the customer has an installation permit from DEH.

a. The building permit will be for the connection between the graywater tank and the sewer lateral, any potable water line connection with required back-flow device, the graywater plumbing to the tank and any electrical service. Electrical is usually a cord and plug connected sump pump.

b. The building department permit will be finaled only after the DEH permit has been signed off.

The fees will be based on the total number of fixtures added or altered. A drawing must be submitted to show existing and proposed piping to the graywater tank.

Figure 1 through 5 of the State Plumbing Code, Appendix G shall be used or drawings submitted must go through plan check and additional fees will be assessed.

6. DEH will inspect the graywater system when notified by the contractor and/or homeowner.

7. DEH will notify the local building department when the DEH permit inspection has been completed. Following DEH approval, the local building department will make the final inspection of the building or grant final approval of the graywater system.

At this point, the graywater permit process will be complete.

**PLOT PLAN REVIEW**

Whenever possible, the plan review should be done "in office" without a field review, especially if there is an accurate as-built of the septic system on file. The one exception to this is review of complex graywater systems, which may require site reviews. These "in office" approvals are not to be construed as approvals at the counter or same-day approvals. The response time for an "in office" approval is to be kept at three working days or less. The response time for site reviews is to be the same as a septic layout (10 days).

At the time of submittal the area specialist or duty specialist is to review the plans and check the files for percolation data or soil type information and any groundwater data. Please refer to the following:

1. Review the files for as-builts or any percolation and groundwater information, for the property. During the as-built review, check adjacent parcels for percolation and groundwater information.

- If the property is in an area of known high groundwater or poor percolation (>60 MPI) advise the client that the property is not suitable for the use of a graywater system.

- If there is no percolation test data in our files, the owner or contractor will need to bring in three or more soil samples taken at the system depth (9" for

drip & 17" for mini-leach line). One cup of soil per sample should be sufficient for texturing.

2. If there is no percolation information, or if the submittal contains soil samples (three or more at the system depth), then the samples are to be textured by staff to determine the sand, silt and clay content. For reference, please refer to the EPA Design Manual Chapter three et al, table 3-7 page 39 and table 7-2 page 214.

- If the sample textures out to be sand, sandy loam, silty loam, loam or porous silt loam then refer to table G-2 & G-3 within Appendix “G” of the State Plumbing Code, "Graywater Systems”.

- If the sample textures-out to be clay loam, silty clay, clay with considerable sand/gravel, or clay, then a percolation test and field review will be necessary.

- If there is insufficient information to ascertain the soil type, or if there are questions as to high groundwater, then a site review will be necessary.

3. The plot plan review will be similar to a septic layout review. The following items are specific to all graywater systems:

- **Three way valve** for diversion of graywater to graywater system or sewer/septic system.

- **Graywater Tank** is to be vented, with a locking gasketed lid, meeting a nationally recognized standard, and be labeled **"GRAYWATER IRRIGATION SYSTEM, DANGER - UNSAFE WATER".**

- **Graywater Tank Location** to allow overflow by gravity flow to sewer or septic system.

- **Over flow pipe** without shutoff valve which allows gravity flow to sewer or septic system.

- **System calculations** with irrigation zones.

- **Pump systems** which include pump description, the pump curve or head information and model number. Also elevations from the pump to the highest point in the graywater system must be provided. A pressure reducer is required if the pump outlet exceeds 20 PSI.

- **Backflow valve** for Pump Systems.

**Subsurface Drip Irrigation** check for the following:

- **Automatic Flush Valve/Vacuum Breaker** for each irrigation zone.

- **Emitter** model number, emitter size, spacing of fourteen inches and coefficient of manufacturing varaition.

- Backflow device to protect the potable water line connection to the backwash filter.

- **Filter** rated at 140-mesh one inch with a capacity of 25 gallons per minute.

- **Other items -** valves, switches, timers, and other controls.

## SITE REVIEW

The site review is similar to layout review with the main point being to determine if there are any soil, groundwater or setback concerns which could result in the improper discharge of graywater. Following items are specific to graywater systems:

- **Graywater tank location** to allow draining or overflow by gravity to the sewer or septic system.

- If a **pump system** is used, the elevations are to be verified with a hand level.

- For **setbacks** please refer to Appendix "G" of the State Plumbing Code, "Graywater Systems"

## SYSTEM INSPECTION

The graywater system inspection is similar to a septic system inspection with the main focus being the tank installation and line or emitter location to determine if there are any conditions which could result in a surface discharge of graywater.

Following items are specific to all graywater systems:

- **The system components are to be per plan,** for tank size; pipe, pump and fitting type and number; and trench length or number of emitters.

- The graywater tank, piping and emitters and other **materials are to meet a nationally recognized testing standard,** such as IAPMO, NSF, AWWA and ASTM.

- **Graywater tank** installed on compacted fill or 3" concrete.

- **The graywater tank is to be labeled "GRAYWATER IRRIGATION SYSTEM, DANGER - UNSAFE WATER".**

- **Tank lid is to be gasketed and locking.**

- **Tank and system leak test** from the tank to the irrigation trench, the system is to be watertight.

- The **tank** is to be properly vented.

- **Pump systems are to be pressure tested** from the tank to the point of irrigation, emitter or trench. The system is to be pressure tested for five minutes at 40 PSI, before burial. Note: The materials for a pump system are the same as those for a subsurface drip irrigation.

- All graywater **piping is to be marked or have a continuous tape stating "DANGER - UNSAFE WATER".**

- Supply lines glued and water tight.

- **Dual irrigation zones.**

- **Maintenance manual** provided by the contractor.

**SUBSURFACE DRIP IRRIGATION** check for the following:

- **Supply lines** of PVC class 200, with schedule 40 fittings, drip lines Poly or flexible PVC.

- **Filter** type per plan.

- **Automatic flush valve/vacuum breaker** for each irrigation zone.

- **Backwash** line to the sewer or septic system.

- **Emitters** type per plan.

- **Pressure reducer** when pump exceeds 20 PSI.

- Other items such as valves, switches, timers and controls.

**MINI-LEACH LINE SYSTEM** check for the following:

- The supply lines are to be watertight and glued, ABS or PVC with schedule 40 fittings

- The leach pipe is to be a minimum of 3" perforated pipe HDPE, PE, ABS or PVC.

**MAINTENANCE**

The maintenance of graywater systems depends on the type of system and sources of graywater. Most systems will need some type of filter, which will need to be cleaned regularly. Pump systems have backflow-valves to prevent short cycling of the pump;

these should be periodically checked for leakage or replaced every few years. Drip systems are subject to clogging, to address this problem they are installed with fine mesh filters. These mesh filters need to be backwashed often to prevent clogging and regularly inspected for tears or wear. If the system is installed by a contractor, then the contractor is to provide the owner with a maintenance manual.

**COMPLAINTS**

- When a complaint of a graywater system failure is received, it is to be responded to as would any sewage complaint. The failure is to be investigated to determine causes and necessary repairs. Official notices are to be issued whenever there is a surface discharge of graywater.

Following the review of the failure, staff are to fill out a graywater system failure report. The report is to be sent to the appropriate Supervising Environmental Health Specialist, Land Use Program.

- A database of information will be maintained to provide reports to the Board of Supervisors or cities.

- Records of the design, construction, and repair of graywater systems will be at each Land Use field office.

- Complaint investigations or observations of illegal and non-permitted graywater system installations by contractors or incomplete/erroneous reports submitted by design engineers/consultants are to be forwarded to the area supervisor to take appropriate action through the State Department of Consumer Affairs.

**SUMMARY:**

The installation of graywater systems within San Diego County is new and changes to these guidelines are expected as systems are installed. If there are any questions, please bring them up to your immediate supervisor.

ATTACHMENTS
1. Appendix G
2. "Is graywater right for you?"
3. Graywater guide
4. DEH fee schedule